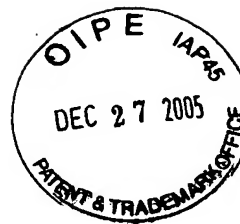


JP72671 ("Morita")



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## CLAIMS

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[Claim(s)]

[Claim 1] The thermal recording object characterized by making a heat-sensitive recording layer contain a composite particle emulsion with (A) self-cross-linking acrylic emulsion, colloidal silica and/or (B) colloidal silica, an acrylic polymer, or a styrene acrylic polymer further in the thermal recording object which prepared the heat-sensitive recording layer containing the basic dye and the coloring agent of colorlessness or light color on the base material, using 4 and 4'-screw (p-toluene sulfonyl aminocarbonyl amino) diphenylmethane as a coloring agent.

## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is excellent in the performance

traverse at the time of record, and, moreover, relates to a chemical-resistant and waterproof good thermal recording object.

[0002]

[Description of the Prior Art] Conventionally, the thermal recording object which both the coloring matter is made to contact with heat using the color reaction of the basic dye of colorlessness or light color and a coloring agent, and obtained the coloring image is known well. Such a thermal recording object has advantages, like a recording device is compact, and moreover it is cheap, and maintenance is easy, and is widely used as an output media of the various printers a POS label, CAD, for CRT medical images, etc., and a plotter only as a medium for record of facsimile, an automatic ticket vending machine, and a science measuring machine. Consequently, the chemical resistance and the water resisting property to a water-color-ink pen, a fluorescence pen, a diazo developer or adhesives, a paste, etc. have been required. Furthermore, it increases, also when used in the open air about a water resisting property, and it is requested also about the improvement of the waterproof reinforcement of a recording layer which was not needed conventionally.

[0003] Therefore, conventionally, in water-soluble adhesives, various cross linking agents are used together, or many combination with the water-soluble high adhesives of cross-linking is proposed (JP,49-32646,A, JP,49-36343,A, JP,50-30539,A, JP,52-145228,A, JP,55-159993,A, JP,57-189889,A). However, by these approaches, sufficient water resisting property was not able to be obtained practical. Moreover, although to raise a water resisting property by on the other hand using a vinyl acetate emulsion, an acrylic emulsion, and a hydrophobic resin emulsion like an SBR latex as adhesives of a heat-sensitive recording layer was also tried, since a stick phenomenon occurred at the time of record, it was not able to be used.

[0004]

[Problem(s) to be Solved by the Invention] This invention solves the above troubles of the conventional technique, and does not have a stick, and it is in moreover offering the chemical-resistant and waterproof outstanding thermal recording object.

[0005]

[Means for Solving the Problem] In the thermal recording object which prepared the heat-sensitive recording layer containing the basic dye and the coloring agent of colorlessness or light color on the base material As a coloring agent, 4 and 4'-screw (p-toluene sulfonyl aminocarbonyl amino) diphenylmethane It uses (this coloring agent is called hereafter). As an adhesives component to a heat-sensitive recording layer further (A) self-cross-linking acrylic emulsion and colloidal silica, And/or, the purpose of this invention has been attained by using a composite particle emulsion with (B) colloidal silica, an acrylic polymer, or a styrene acrylic polymer.

[0006]

[Function] Although it turned out that the thermal recording object which was excellent in shelf lives, such as chemical resistance, by using this coloring agent for a heat-sensitive recording layer is acquired, especially when the adhesives which only consist of the usual hydrophobic resin emulsion for an improvement of a water resisting property were used, a practical new trouble arose that it is easy to generate a stick at the time of record. In this invention, as a result of considering use of various adhesives wholeheartedly, by using together a composite particle emulsion with this coloring agent, (A) self-cross-linking acrylic emulsion, colloidal silica and/or (B) colloidal silica, an acrylic polymer, or a styrene acrylic polymer, it excelled in the water resisting property and it became clear that the thermal recording object which moreover does not have generating of dregs adhesion of a stick or a recording head at the time of record was acquired.

[0007] The self-cross-linking acrylic emulsion in this invention is an

emulsion which consists of the polymer or copolymers which generates mesh-like macromolecule structure and is obtained from an acrylic acid, methacrylic acids, or those ester, when this functional group carries out crosslinking reaction to a polymer or the copolymer itself with a reactant functional group. As an example of crosslinking reaction, a reaction with reactions with the reactions between comrades, and these radical and carboxyl groups of a cross linking agent, such as the carboxyl group in an acrylic acid, methacrylic acids, or those denaturation objects, a hydroxyl group, an amino group, an epoxide radical, an amide group, or N-methylol amide group, a hydroxyl group, the amino group, N-methylol radical, N-methylol ether group, an isocyanate radical, an epoxy group, and an aldehyde group or those radicals, a metal ion, or metallic compounds is mentioned, for example.

[0008] As an example of a self-cross-linking acrylic emulsion A vinyl acetate-acrylic-acid copolymerization object, a vinyl acetate-methacrylic-acid copolymerization object, A vinyl acetate-acrylic-acid alkyl copolymerization object, a vinyl acetate-alkyl methacrylate copolymerization object. An acrylonitrile-acrylic-acid copolymerization object, an acrylonitrile-acrylic-acid alkyl copolymerization object, An acrylonitrile-alkyl methacrylate copolymerization object, an acrylonitrile-methacrylic-acid-acrylic-acid alkyl-alkyl methacrylate-styrene copolymerization object, An acrylonitrile-methacrylic-acid dialkylamino alkyl-acrylamide copolymerization object, Metal salts, such as an acrylic-acid-methacrylic-acid copolymerization object and an acrylic-acid-acrylic-acid alkyl copolymerization object, An acrylic-acid-acrylic-acid alkyl-acrylamide copolymerization object, an acrylic-acid-methacrylamide-styrene acid copolymerization object, A methacrylic-acid-acrylic-acid alkyl-alkyl methacrylate copolymerization object, A methacrylic-acid metal salt-acrylic-acid alkyl-alkyl methacrylate

copolymerization object, A methacrylic-acid-acrylic-acid alkyl-alkyl methacrylate-acrylamide copolymerization object, A methacrylic-acid-alkyl methacrylate copolymerization object, an acrylic-acid alkyl-acrylamide-styrene copolymerization object, An alkyl methacrylate-acrylic-acid alkyl-maleic-anhydride copolymerization object, An alkyl methacrylate-acrylic-acid alkyl-maleic-anhydride metal salt copolymerization object, Let these denaturation objects, such as an acrylic-acid alkyl-styrene-maleic-anhydride metal salt copolymerization object, an alkyl methacrylate-fumaric-acid copolymerization object, and an acrylic-acid alkyl-itaconic-acid metal salt copolymerization object, be drainage system emulsions using an emulsifier etc. if needed.

[0009] The alkyl in the above-mentioned self-cross-linking acrylic emulsion shows with a carbon numbers [ , such as methyl, ethyl, propyl, butyl, and 2-ethylhexyl, ] of ten or less saturated hydrocarbon, and salts, such as ammonium, and Li, Na, K, Mg, calcium, aluminum, are mentioned as a metal salt.

[0010] The colloidal silica used by this invention is used as the colloidal solution which water was made [ colloidal solution ] into the dispersion medium and made the ultrafine particle of a silicic anhydride distribute underwater. The magnitude of the particle of colloidal silica has the desirable thing of 10-100mmicro and specific gravity 1.1-1.3. As for PH of the colloidal solution in this case, about seven to 10 thing is used preferably.

[0011] It is desirable to carry out 3-50 weight section combination to the heat-sensitive recording layer 100 weight section as loadings of a self-cross-linking acrylic emulsion, and it is 5 - 30 weight section more preferably. When fewer than this, water resisting properties run short and a sensibility fall is more remarkable than this in many loadings. The desirable loadings of colloidal silica have the desirable 1 - 100 weight section to the self-bridge formation mold acrylic emulsion 100 weight section, and are 30 -

60 weight section more preferably. If there are few loadings than this, a stick and a water resisting property become inadequate, and when [ than this range ] more, a problem will appear in the-like stability at the time of \*\* of a coating.

[0012] Moreover, although a composite particle emulsion with colloidal silica, an acrylic polymer, or a styrene acrylic polymer is used as an adhesives component of a heat-sensitive recording layer in this invention and it is not limited especially about the manufacture approach, it is manufactured by the approach of introducing colloidal silica into a resinous principle by a silane coupling agent etc. in the process which carries out polymerization formation of an acrylic polymer or the styrene acrylic polymer, for example etc. the monomer component 100 weight section which generally forms an acrylic polymer or a styrene acrylic polymer although it does not limit especially about the introductory rate of colloidal silica -- receiving -- the 1 - 200 weight section -- the colloidal silica of the 20 - 150 weight section is introduced preferably. If the waterproof improvement effectiveness cannot be expected that the introductory rate of colloidal silica is under 1 weight section but the 200 weight sections are exceeded conversely, the role rate as adhesive resin will be spoiled and a paint film will become weak.

[0013] As an acrylic monomer which forms the above-mentioned acrylic polymer or a styrene acrylic polymer For example, an acrylic acid, a methyl acrylate, an ethyl acrylate, butyl acrylate, Isobutyl acrylate, acrylic-acid cyclohexyl, 2-ethylhexyl acrylate, Acrylic-acid hydroxyethyl, a methacrylic acid, a methyl methacrylate, Ethyl methacrylate, methacrylic-acid butyl, methacrylic-acid isobutyl, Cyclohexyl methacrylate, 2-ethylhexyl methacrylate, As loadings of a composite particle emulsion with the colloidal silica, the acrylic polymer, or styrene acrylic polymer to which methacrylic-acid-tert-butyl etc. is mentioned 1 - 70 weight section is

desirable to the total-solids 100 weight section in a heat-sensitive recording layer, and it is 5-30 weight section more preferably.

[0014] As basic dye made to contain all over the heat-sensitive recording layer of this invention The basic dye of well-known colorlessness and light color can be used. various kinds -- as an example For example, 3 and 3-screw (p-dimethylamino phenyl)-6-dimethylamino phthalide, 3-(4-diethylamino-2-methylphenyl)-3-(4-dimethylamino phenyl)-6-dimethylamino phthalide, 3-diethylamino-7-dibenzylamino-benzo[a] fluoran, 3-(N-ethyl-N-p-tolyl) amino-7-N-methyl anilino-fluoran, 3-diethylamino-7-anilino-fluoran, 3-diethylamino-7-dibenzylamino fluoran, 3, 6-screw (diethylamino) fluoran-gamma-anilinolactam, 3-cyclohexylamino-6-chloro-fluoran, 3-diethylamino-6-methyl-7-chloro-fluoran, 3-diethylamino-7-chloro-fluoran, 3-(N-ethyl-N-isoamyl) amino-6-methyl-7-anilino-fluoran, 3-(N-methyl-N-cyclohexyl) amino-6-methyl-7-anilino-fluoran, 3-diethylamino-6-methyl-7-anilino-fluoran, 3-JI (n-butyl) amino-6-methyl-7-anilino-fluoran, 3-JI (n-pentyl) amino-6-methyl-7-anilino-fluoran, 3-diethylamino-7-(o-chlorophenylamino) fluoran, 3-JI (n-butyl) amino-7-(o-chlorophenylamino) fluoran, 3-diethylamino-7-(o-fluoro phenylamino) fluoran, 3-JI (n-butyl) amino-7-(o-fluoro phenylamino) fluoran, 3-(N-ethyl-p-torr IJINO)-6-methyl-7-anilino-fluoran, 3-(N-ethyl-p-torr IJINO)-6-methyl-7-(p-torr IJINO) fluoran, 3-(N-ethyl-N-furfuryl amino)-6-methyl-7-anilino-fluoran, 3-diethylamino-6-chloro-7-anilino-fluoran, 3-(N-methyl-N-n-propylamino)-6-methyl-7-anilino-fluoran, 3, 3-screw [1-(4-methoxyphenyl)-1-(4-dimethylamino phenyl) ethylene-2-IRU]-4, 5 and 6, 7-tetra-chloro phthalide, 3, 3-screw [1-(4-methoxyphenyl)-1-(4-pyrrolidino phenyl) ethylene-2-IRU]-4, 5 and 6, 7-tetra-chloro phthalide, 3, 3-screw [1 and 1-screw (4-pyrrolidino phenyl) ethylene-2-IRU]-4, 5 and 6, 7-tetrabromo

phthalide, 3-p-(p-dimethyl friend NOR NIRINO)  
 ANIRINO-6-methyl-7-chlorofluoran, 2 and 2-screw  
 {4-[6'-(N-cyclohexyl-N-methylamino)-3' SUPIRO [ - methyl ] [phthalide -3  
 and 9 ' xanthene -2'-ylamino] phenyl} propane, 3 and 6. 11-Tori  
 (dimethylamino) fluoran, etc. are mentioned. Of course, it is not limited to  
 these and two or more sorts can also be used together if needed.

[0015] As for especially this coloring agent, it is desirable to combine with  
 3-JI (n-butyl) amino-6-methyl-7-anilino fluoran or 3-JI (n-butyl)  
 amino-7-(o-chloroanilino) fluoran.

[0016] This coloring agent can use a well-known coloring agent together  
 conventionally in the range which does not check desired effectiveness. Such  
 a coloring agent is liquefied or evaporated above 70 degrees C. reacts with  
 said basic dye, and makes this color preferably beyond ordinary temperature.  
 As this coloring agent, for example The activated clay, attapulgite, colloidal  
 silica, Inorganic-acid nature matter [ , such as aluminum silicate, ], 4, and  
 4'-isopropylidene diphenol, A 2 and 2-screw (4-hydroxyphenyl)-4-methyl  
 pentane, 4, and 4'-dihydroxydiphenyl sulfide, Hydroquinone monobenzyl  
 ether, 4-hydroxybenzoic-acid benzyl, - dihydroxy diphenylsulfone, and 4 and  
 4 '2, 4'-dihydroxy diphenylsulfone, 4-hydroxy-4'-isopropoxy diphenylsulfone,  
 a screw (3-allyl compound-4-hydroxyphenyl) sulfone, 4-hydroxy-4'-methyl  
 diphenylsulfone, screw (4-hydroxy phenylthio ethoxy) methane, 1, a 5-JI  
 (4-hydroxy phenylthio)-3-OKISA pentane, Screw (p-hydroxyphenyl) butyl  
 acetate, screw (p-hydroxyphenyl) methyl acetate, 1 and 1-screw  
 (4-hydroxyphenyl)-1-phenyl ethane, 1, 4-screw  
 [alpha-methyl-alpha-(4'-hydroxyphenyl) ethyl] benzene, Phenol nature  
 compounds, such as a JI (4-hydroxy-3-methylphenyl) sulfone,  
 4-[2-(p-methoxy phenoxy) ethyloxy] salicylic acid, 4-[3-(p-tolyl sulfonyl)  
 propyloxy] salicylic acid, Aromatic carboxylic acid, such as 5-[p-(2-p-methoxy  
 phenoxy ethoxy) cumyl] salicylic acid, And the salts, polyvalent metal, such



as the zinc of these aromatic carboxylic acid, magnesium, aluminum, calcium, titanium, manganese, tin, and nickel, the organic-acid nature matter which is the antipyrin complex of thiocyanic acid zinc etc. further are illustrated.

[0017] in addition -- although the rate of an use rate of basic dye and a coloring agent is not what it is suitably chosen according to the class of basic dye and the coloring agent to be used, and is limited especially -- general -- the basic dye 1 weight section -- receiving -- a coloring agent 1 - 50 weight sections -- the coloring agent of 2 - 10 weight section extent is used preferably.

[0018] Generally the coating liquid for heat-sensitive recording layers containing the matter like the above uses water as a dispersion-medium object, distributes a color and a coloring agent that it is together or separately with stirring and grinders, such as a ball mill, attritor, and a sand mill, and is prepared.

[0019] In this invention, although a composite particle emulsion with a self-cross-linking acrylic emulsion and/or colloidal silica, an acrylic polymer, or a styrene acrylic polymer is used as a subject as adhesives resin contained in a heat-sensitive recording layer, the thing of what is known as adhesives resin for heat-sensitive recording layers generally because of a coating fluidity improvement etc. to combine is possible. As the example, polyvinyl alcohol, carboxy group denaturation polyvinyl alcohol, Aceto acetyl group denaturation polyvinyl alcohol, cation radical denaturation polyvinyl alcohol, Sulfone radical denaturation polyvinyl alcohol, silica denaturation polyvinyl alcohol, Starch and its derivative, gum arabic, gelatin, casein, methyl cellulose, Hydroxyethyl cellulose, a hydroxymethyl cellulose, a polyvinyl pyrrolidone, Although water soluble resin, such as polyacrylate, polyacrylamide, a styrene maleic anhydride copolymer, a methyl-vinyl-ether-maleic-anhydride copolymer, and an isopropanal pyrene-maleic-anhydride copolymer, can be used together In order not to

spoil the water resisting property of a paint film, it is desirable to use combining the water-soluble-resin adhesives containing a reactant radical. for example, the aceto acetyl group, a carboxyl group, or an amide group. As a cross linking agent, inorganic compounds, such as diglycidyl system compounds, such as polyamine system compounds, such as multiple-valued aldehyde system compounds, such as glyoxal, a glutaraldehyde, and dialdehyde starch, and polyethyleneimine, epoxy compound, polyamide resin. and glycerol diglycidyl ether, a dimethylol urea compound, ammonium persulfate and a ferric chloride and a magnesium chloride, and carbonic acid zirconia Amon, or a boric acid, and a borax can be used.

[0020] Although organic system resin impalpable powder, such as urea-formalin resin, a styrene-methacrylic-acid copolymer, and polystyrene resin, can be raised to inorganic system impalpable powder, such as the aluminum hydroxide which can use various pigments together in a heat-sensitive recording layer, a calcium carbonate, a magnesium carbonate, talc, a silica, the diatom earth, synthetic aluminum silicate, a zinc oxide, titanium oxide, an aluminum hydroxide, a barium sulfate, a calcium carbonate by which surface treatment was carried out. and a silica, and a list, to this coloring agent, combination with an aluminum hydroxide is desirable.

[0021] In a heat-sensitive recording layer, various kinds of assistants can be added if needed. For example, dioctyl specific sulfonate, Sodium dodecyl benzenesulfonate, lauryl alcohol sulfate sodium, Distributed objects, such as a fatty-acid metal salt, zinc stearate, calcium stearate, Polyethylene wax, a cull navarho, paraffin wax, ester wax, etc. reach waxes. A sensitizer can also be used together the auxiliary addition component commonly used conventionally by the thermal recording object, for example, a dispersant, a surfactant, an antioxidant, an ultraviolet-rays inhibitor, a coloring color, a color pigment, and if needed. As an example of a sensitizer, for example

Octadecanamide, a methoxycarbonyl-N-stearin acid benzamide, N-benzoyl octadecanamide, N-eicosanoic acid amide, ethylene bis-octadecanamide, A behenic acid amide, methylenebis octadecanamide, N-methylol octadecanamide, Terephthalic-acid dibenzyl, p-benzyloxy benzyl benzoate, 1-hydroxy-2-naphthoic-acid phenyl, 2-naphthyl benzyl ether, m-terphenyl, dibenzyl oxalate, Oxalic acid-G p-methylbenzyl, oxalic acid-G p-chloro benzyl, p-benzyl biphenyl, Trilby phenyl ether, the JI (p-methoxy phenoxy ethyl) ether, 1, 2-JI (3-methylphenoxy) ethane, 1, 2-JI (4-methylphenoxy) ethane, 1, 2-JI (4-methoxy phenoxy) ethane, 1, 2-JI (4-chloro phenoxy) ethane, 1, 2-JIFENOKISHI ethane, 1-(4-methoxy phenoxy)-2-(3-methylphenoxy) ethane, p-methylthio phenyl benzyl ether, 1, 4-JI (phenylthio) butane, p-aceto toluidide, p-aceto FENECHIJIDO, N-aceto acetyl-para toluidine, JI (beta-biphenyl ethoxy) benzene, p-JI (vinyloxy ethoxy) benzene, 1-isopropyl phenyl-2-phenyl ethane, etc. are mentioned. Although especially the addition of these sensitizers is not limited, it is desirable to adjust in the range which generally does not exceed 4 weight sections to the coloring agent 1 weight section.

[0022] Moreover, if needed, in order to raise the preservation stability of a record image, a shelf-life amelioration agent can also be added. As an example of this shelf-life amelioration agent, for example 2 and 2'-methylenebis (4-methyl-6-tert-butylphenol), 2 and 2'-methylenebis (4-ethyl-6-tert-butylphenol), A 2 and 2'-ethylidene screw (4, 6-G tert-butylphenol), A 4 and 4'-thio screw (3-methyl-6-tert-butylphenol), A 4 and 4'-thio screw (2-methyl-6-tert-butylphenol), - thio screw (2-methyl phenol), and 4 and 4' 4, 4'-butylidenebis (6-tert-butyl-m-cresol --) 1-[alpha-methyl-alpha-(4'-hydroxyphenyl) ethyl]-4-[alpha' and alpha'-screw (4"-hydroxyphenyl) ethyl] benzene, 1, 1, 3-tris (2-methyl-4-hydroxy-5-cyclohexyl phenyl) butane, 1, 1, 3-tris (2-methyl-4-hydroxy-5-tert-buthylphenyl) butane. - dihydroxy -3, 3', and 4

and 4'-5, 5'-tetrabromo diphenylsulfone, - dihydroxy -3, 3', and 4 and 4'-5, 5'-tetramethyl diphenylsulfone, 2 and 2-screw (4-hydroxy - 3, 5-dibromophenyl) propane, 2 and 2-screw (4-hydroxy - 3, 5-dichlorophenyl) propane, Hindered phenolic compounds, such as 2 and 2-screw (4-hydroxy - 3, 5-dimethylphenyl) propane, 1, 4-diglycidyl oxybenzene, 4, and 4'-diglycidyl oxy-diphenylsulfone, Terephthalic-acid diglycidyl, a cresol novolak mold epoxy resin, Epoxy compounds, such as a phenol novolak mold epoxy resin and the bisphenol A mold epoxy resin, - G 2-naphthyl-p-phenylene diamine, and N and N', 2'-methylenebis (4, 6-G tert-butylphenyl) sodium phosphate, - G 2-naphthyl-p-phenylene diamine, and N and N', 4'-screw (ethyleneimine carbonylamino) diphenylmethane etc. is mentioned.

[0023] In this invention, it is not limited especially about the formation approach of a heat-sensitive recording layer, and can form according to the technique of common knowledge common use from the former. For example, it can form by the approach of applying and drying coating liquid on a base material by air knife coating, BARIBA blade coating, PYUA blade coating, short duel coating, curtain coating, etc. Moreover, it is not limited especially about the coverage of coating liquid, either, but is usually 2 - 12 g/m<sup>2</sup> at dry weight. It is the range. They are used by paper, a synthetic paper, the plus CHIIKKU film, etc. as a base material, choosing suitably. Moreover, various kinds of well-known techniques in the thermal recording object manufacture field, such as preparing an under coat or performing data smoothing, such as super calender credit, after class coating, can be added to a base material if needed.

[0024] Furthermore, a flesh-side surface layer can be prepared in a heat-sensitive recording layer and an opposite side at the thermal recording object of this invention if needed, and correction of curl can be aimed at.

[0025]

[Example] Although an example explains this invention still more concretely

below, of course, the range of this invention is not limited to these. In addition, the "weight section" and "% of the weight" are shown the "section" and "%" among each example, respectively.

[0026] Example 1A liquid (color-enhancing color dispersion liquid) preparation 3 · The JI (n-butyl) amino-6-methyl-7-anilino-fluoran 40 section and the constituent which consists of the 20% water-solution 20 of the ammonium salt (trade name: made in [ Arakawa chemistry company ] Pori Mallon 1333) of a styrene maleic anhydride copolymer section and the water 40 section as dispersants were ground so that mean particle diameter might be set to 0.8 micrometers by Ur Travis Comil (Sand grinder made from eye MEKKUSU), and A liquid was obtained.

[0027] B liquid (coloring agent, heat fusibility dispersion liquid) preparation 4, the 4'-screw (p-toluenesulfonyl amino carbonylamino) diphenylmethane 20 section, the oxalic acid G p-methylbenzyl ester 25 section, and the constituent that consists of the 20% (trade name: made in [ Arakawa chemistry company ] Pori Mallon 1333) water-solution 10 of ammonium salt section of a styrene maleic anhydride copolymer and the water 45 section as dispersants were ground so that mean particle diameter might be set to 0.8 micrometers by Ur Travis Comil (Sand grinder made from eye MEKKUSU), and B liquid was obtained.

[0028] The high-speed agitator distributed the constituent which consists of the C fluid (pigment dispersion liquid) preparation aluminum-hydroxide (trade name: HAIJI light H42, Showa Denko K.K. make) 60 section, the polycarboxylic acid mold giant-molecule surface-active-agent (trade name: KYARIBON L400, Mitsuhiro formation shrine make) 0.1 section, and the water 40 section, and C fluid was obtained.

[0029] The formation A liquid 25 section of a recording layer, the B liquid 90 section, the C fluid 50 section, the 30% dispersion-liquid 8 of zinc stearates section, As the paraffin wax 30% dispersion-liquid 15 section and adhesives.

the self-bridge formation mold acrylic resin emulsion (trade name: FC60, Nippon Junyaku make) 50 section of 25% of solid concentration. And the coating liquid for heat-sensitive recording layers which consists of the colloidal silica (trade name: Snow tex N, Nissan chemistry company make) 25 section 20% 50 g/m<sup>2</sup> To one side of paper of fine quality, the coverage after desiccation is 6.0 g/m<sup>2</sup>. It applied so that it might become, and data smoothing was performed and the thermal recording object took after forming a heat-sensitive recording layer so that smoothness/J.TAPPI-A method (J. TAPPI No.5) might become 2000 seconds by the supercalender.

[0030] In formation of example 2 recording layer, the thermal recording object was acquired like the example 1 except having used the self-bridge formation mold acrylic resin emulsion (trade name: KOGAMU RT-110, Showa High Polymer Co., Ltd. make) 50 section of 25% of solid concentration instead of the self-bridge formation mold acrylic resin emulsion (trade name: FC60, Nippon Junyaku make) 50 section of 25% of solid concentration.

[0031] In formation of example 3 recording layer, the thermal recording object was acquired like the example 1 except having used the self-bridge formation mold acrylic resin emulsion (trade name: ply mull NW1402, made in loam & Haas) 21 section of 60% of solid concentration instead of the self-bridge formation mold acrylic resin emulsion (trade name: FC60, Nippon Junyaku make) 50 section of 25% of solid concentration.

[0032] In formation of example 4 recording layer The A liquid 25 section, the B liquid 90 section, the C fluid 40 section, The 30% dispersion-liquid 7 of zinc stearates section, the paraffin wax 30% dispersion-liquid 20 section. And the coating liquid for heat-sensitive recording layers which the intramolecular solid weight content of colloidal silica and a styrene-methyl-acrylate copolymer becomes from the composite particle emulsion (45% concentration) 40 section which is 1:2 as adhesives 50g/m<sup>2</sup> To one side of paper of fine quality, the coverage after desiccation is 6.0 g/m<sup>2</sup>. It

applied and dried so that it might become, and after forming a heat-sensitive recording layer, data smoothing was performed and the thermal recording object was acquired so that smoothness/J.TAPPI-A method (J. TAPPI No.5) might become 2000 seconds by the supercalender.

[0033] They are colloidal silica and styrene instead of being the composite particle emulsion (45% concentration) 40 section whose intramolecular solid weight content of colloidal silica and a styrene-methyl-acrylate copolymer is 1:2 in formation of example 5 recording layer. -(2-ethylhexyl acrylate)- The thermal recording object was acquired like the example 4 except having used the composite particle emulsion (45% concentration) 40 section whose intramolecular solid weight content of a methyl-methacrylate copolymer is 1:2.

[0034] In formation of example 6 recording layer, the thermal recording object was acquired like the example 4 except having used the composite particle emulsion (45% concentration) 40 section whose intramolecular solid weight content of colloidal silica and a methyl-acrylate-methyl-methacrylate copolymer is 1:2 instead of being the composite particle emulsion (45% concentration) 40 section whose intramolecular solid weight content of colloidal silica and a styrene-methyl-acrylate copolymer is 1:2.

[0035] In formation of example of comparison 1 recording layer, the thermal recording object was acquired like the example 1 except having removed colloidal silica (trade name: the Snow tex N, the Nissan chemistry company make).

[0036] In formation of example of comparison 2 recording layer, the thermal recording object was acquired like the example 1 except having used the thermoplastic mold acrylic resin emulsion (trade name: ply mull AC 22, made in loam & Haas) 28 section of 44.5% of solid concentration instead of the self-bridge formation mold acrylic resin emulsion (trade name: FC60, Nippon Junyaku make) 50 section of 25% of solid concentration.

[0037] In formation of example of comparison 3 recording layer, the thermal recording object was acquired like the example 1 except having used the 25% (trade name: Peto Rocco-TO C-8, Japanese dregs chemistry company make) water-solution 50 of denaturation starch section instead of the self-bridge formation mold acrylic resin emulsion (trade name: FC60, Nippon Junyaku make) 50 section of 25% of solid concentration.

[0038] In formation of example of comparison 4 recording layer, the thermal recording object was acquired like the example 4 except having used the styrene-butadiene copolymer emulsion (trade name: L1537, Asahi Chemical Co., Ltd. make) 36 section of 50% of solid concentration instead of being the composite particle emulsion (45% concentration) 40 section whose intramolecular solid weight content of colloidal silica and a styrene-methyl-acrylate copolymer is 1:2.

[0039] In formation of example of comparison 5 recording layer, the thermal recording object was acquired like the example 4 except having used the 15% water-solution 120 of the ammonium salt (trade name: made in [ Arakawa chemistry company ] Pori Mallon 1316) of polyacrylic acid section instead of being the composite particle emulsion (45% concentration) 40 section whose intramolecular solid weight content of colloidal silica and a styrene-methyl-acrylate copolymer is 1:2.

[0040] The following evaluations were performed about the thermal recording object acquired in each example and the example of a comparison, and the result was shown in Table 1.

[0041] (1) Record sensibility and high speed facsimile by stick evaluation NEC Corp. : while it printed using standard chart No.2 of the Institute of Image Electronics Engineers of Japan by NEFAKKUSU 23 and the following criteria estimated the stick generating situation in the case of record, the coloring concentration of the obtained record image was measured with the Macbeth densimeter (RD-914 mold, made in Macbeth), and it considered as



the value representing the record sensibility of a thermal recording object.

< stick evaluation >O: With no stick generating.

\*\* : Generating of a stick sound was accepted.

x: The loud stick sound occurred and the turbulence of line spacing arose also in the image.

[0042] (2) In the case of various office supplies, various chemical resistance test fluorescence pens, and a marker, after contacting the paper of fine quality which wrote down on the thermal recording body surface usual, and was made to become wet with a diazo developer about the resistance over a diazo developer to a record body surface, the visual judgment was carried out about fogging of the non-colored section (natural complexion), and the following criteria estimated.

[0043] After having twisted the vinyl chloride wrap film (trade name: KMA-W, Mitsui Toatsu Chemicals, Inc. make) on the polypropylene pipe (40mmphi tubing) three-fold, having placed on it the above-mentioned thermal recording object which carried out printing coloring, twisting around three-fold vinyl chloride wrap film on it further and leaving it at 40 degrees C about plasticizer-proof nature for 24 hours, the visual judgment was carried out about the coloring part of a thermal recording object fading, and the following criteria estimated.

O : practically with no problem.

\*\* : It is a problem a little practically.

x: Practical use is impossible.

[0044] (3) After hanging down one drop of waterdrop to the front face of a waterproof thermal recording object, it ground against the finger 50 times, the visual judgment of the peeling degree of a recording surface was carried out, and the following criteria estimated.

< water-resisting-property evaluation >O: Peeling of a recording surface does not have \*\*\*\*\*.

\*\* : There is a little peeling of a recording surface.

x : There is much peeling of a recording surface.

[0045]

[Table 1]

	発色濃度	スティック stick	耐薬品性 (地肌カブリ)			耐可塑剤性 記録部	耐水性 water	resistance recorded section
			蛍光 イン	マジック イン	ジアゾ 現像液			
example → 実施例 1	1.3 0	○	○	○	○	○	○	○
実施例 2	1.3 1	○	○	○	○	○	○	○
実施例 3	1.3 3	○	○	○	○	○	○	○
実施例 4	1.3 0	○	○	○	○	○	○	○
実施例 5	1.3 1	○	○	○	○	○	○	○
実施例 6	1.3 2	○	○	○	○	○	○	○
com.example → 比較例 1	1.2 9	△	△	△	△	△	△	△
比較例 2	1.2 7	×	△	△	△	△	△	△
比較例 3	1.3 0	△	×	×	×	×	×	×
比較例 4	1.2 0	×	△	△	△	△	○	○
比較例 5	1.2 4	△	△	△	△	○	△	△

[0046]

[Effect of the Invention] The thermal recording object of this invention does not have a stick, and, moreover, was excellent in chemical resistance and a water resisting property so that clearly also from the result of Table 1.

[Translation done.]